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**EXTRACT FROM THE RECORDS OF THE RUMFORD COMMITTEE.**

It was voted that in the judgment of the committee, persons carrying on researches with the aid of the Rumford fund should submit to the academy an account of their researches not less complete than that published elsewhere. These researches may be published in any place or form, with the proviso that due recognition be made of the grant, and of the presentation of the paper to the academy.

**SCIENTIFIC BOOKS.**

**THE INTERNATIONAL CODE OF ZOOLOGICAL NOMENCLATURE AS APPLIED TO MEDICINE.**

As Bulletin No. 24 of the Hygienic Laboratory of the Public Health and Marine Service of the United States, Dr. Charles Wardell Stiles has reprinted the English text of the recently adopted 'International Code of Zoological Nomenclature, with remarks and a discussion of its application to animals concerned in medical pathology.'

This code was drawn up after several preliminary meetings and discussions at the fifth International Zoological Congress at Berlin (1901) and was adopted in printed form at the sixth congress at Berne (1904).

It is based on a number of earlier codes, the 'Stricklandian Code' (1842-3), the 'Dall Code' (1877) and the 'Code of the American Ornithologists Union' (1885), being historically among the most important of these. The present code is the work of a commission composed of Raphael Blanchard, of Paris; J. V. Carus, of Leipzig; F. A. Jentink, of Leyden; P. L. Slater, of London, and C. W. Stiles, of Washington. The final editors were Blanchard, von Maerenthal and Stiles.

At Berne, a larger permanent commission was organized, so constituted that five members retire every three years, and the present membership is as follows: Retiring in 1907, R. Horst, of Leyden; J. A. Jentink, of Leyden; D. S. Jordan, of Stanford; F. E. Schulze, of Berlin, and L. Stejneger, of Washington. In 1910, R. Blanchard, of Paris; L. Joubin, of Paris; C. W. Stiles, of Washington; Th. Studer, of Berne, and R. R. Wright, of Toronto. In 1913, Ph. Dautzenberg, of Paris; W. E. Hoyle, of Manchester; L. von

Graff, of Graz; F. C. von Maerenthal, of Berlin, and H. L. Osborn, of Columbia. This broad representation among men of various nations and specialties engaged in common problems should go far toward securing acceptance of the rules adapted—though the final test must be their actual fitness to the purpose for which they are adapted.

In 1886, Ludwig estimated the number of known species of animals at 312,015. Since that time, nearly half as many more have been added, and the actual number of species of insects alone, known and unknown, is estimated by Dr. L. O. Howard at nearly 4,000,000.

About 120,000 generic names have been applied to animals, and the number increases at the rate of about 1,150 per year. As much of the world is still virtually unexplored, Dr. Stiles concludes:

The known genera and species of animals represent but a fraction (but ten to twenty per cent.) of the zoological names which will come into use during the next two or three centuries. It is clear that our nomenclatural tasks are easy, compared with the tremendous number of technical names the future generations will fall heir to. Under these circumstances, it is seen that in order to prevent our science from becoming 'a mere chaos of words,' every zoological author owes a serious nomenclatural duty, not only to himself and his colleagues of to-day but also to future generations of zoologists. If it were left to each author to accept or reject names according to his own personal wishes in the matter, the science of zoology would soon reach a stage in which it would be difficult for one author to understand the writings of another, hence in order to prevent such a chaotic state, systematists have felt themselves forced to adopt certain rigid rules in accordance with which any given animal has only one valid name, and that name shall be valid not only in the country in which it is proposed, but in all other lands as well.

The insistence on exactness in nomenclature is as important to the worker in systematic zoology or in geological distribution, as cleanliness and sharpness of scalpel to the anatomist. No one failing to consider carefully his obligations in these regards, ever did first class work in the fields in question.

If there were only a few animals concerned,

we might give way to our tastes or prejudices in the choice of names. Most of us would rather say *Amphioxus* than *Branchiostoma*, *Pterichthys* than *Pterichthyodes*, *Lucioperca* than *Stizostedion*. But if we transgress our rules and use the later name or the preoccupied name in these familiar examples, we have no case against the man who follows his own whims throughout the series. We must either use the oldest names throughout, or else let anybody call anything what he pleases. This means absolute chaos in all lines of study where nomenclature is required.

The present code seems in all respects admirable. It covers the ground more fully than any other. In other words, it eliminates more successfully all the elements of whim, taste or individual preference. It is well to have names euphonious, descriptive and correctly formed. It is almost infinitely more important to have them stable, and there is no other way to stability save the rigid enforcement of rules which find their origin in the conditions of science itself.

In this code, zoological nomenclature is regarded as separate from botanical, though parallel with it. The law of priority is held paramount and nomenclature dates from 1758, the tenth edition of the 'Systema Naturæ' of Linnæus. No name is to be changed because of incorrect spelling or formation, nor rejected on account of inappropriateness. Generic names spelled differently are held to be distinct names, for a name is known by its spelling. Tautonomy (*Anguilla anguilla* and the like) is permitted. 'Once a synonym always a synonym' is a maxim adopted with an exact definition.

Some parts of the code are not sufficiently full. For example, the status of generic names of non-binomial authors subsequent to Linnæus is not clearly stated. Thus in 1763, Gronow published a number of genera of fishes, the species under each being given in polynomials. In other words, he recognized genera but did not adopt the binary system of Linnæus. The code does not leave it clear whether these post-Linnæan non-binomial genera should be adopted.

Mr. Stejneger (in letter, February 25, 1905)

states that it was the judgment of the commission that the genera of non-binomial authors, dating after 1758, should be admitted. In the Code (Article 2) it states that 'the scientific designation of animals is uninomial for subgenera and all higher groups.' According to Stejneger, 'The rule applied to the generic term would be that the valid name of a genus can be only that name by which it was first designated on the condition that the author has *applied* the principles of the international rules by using a nominal designation.'

Under this ruling:

Brisson and the others (Gronow, etc.) have applied the principle in question so far as generic names are concerned, and their generic names are, therefore, valid, while their binomials or trinomials are not valid though they may appear (accidentally) like true specific or subspecific names. The monomials are true generic names and must stand as such.

Another class of names claiming priority is not touched at all by this code. Klein (about 1744) defined a large number of genera of fishes. In a post-Linnæan compilation of Walbaum ('Artedi Piscium,' 1792), the diagnoses of all these pre-Linnæan genera are reprinted, although without formal adoption into the binomial system. These genera are monomially defined, at a later date than 1758, and there is no doubt as to the species intended to be included in them. If these names had been original with Walbaum, they would be accepted without question. What is their status as reprints in a compilation?

The article (30) fixing the type of a composite genus is inadequate, and gives evidence of compromise among conflicting views. It is here that much of the present trouble in zoological nomenclature arises. The paragraph in question reads:

If the original type of a genus was not indicated, the author who first subdivides the group may apply the name of the original genus to such restricted genus or subgenus as may be judged advisable, and such assignment is not subject to subsequent change.

This looks simple, but in practise it needs further definition. Many revisers have restricted the old genus to species with which

they are not themselves concerned. The type should be the best known species from the standpoint of the author. Frequently the first reviser (as of *Esox* and *Syngnathus*) selects as type a species which was by no means central or typical in the estimation of the original author. Still more frequently it is impossible to tell who is the first reviser, unless that phrase itself receive accurate definition. In the early days, many authors paid little attention to earlier genera, and in their reviews they encroached on the groups named by their predecessors, without limiting them or fixing their species. If the phrase is retained, the first reviser should be the one who first consciously limited the range of the genus by fixing the actual name to one of the actual original species. This at least is tangible. When a type is not fixed either by the original author or by his 'first reviser,' the code makes certain recommendations to the systematist. These seem to be of the nature of advice, and are void and of no effect when a type has been previously fixed. Third among these comes the method of elimination, a plausible process, but one which has never been defined and which in complex cases leads to as many different results as there are writers who attempt to use it.

In the code, these recommendations are made subordinate to the rule of the 'first reviser.' It is a question, however, whether the first and second of these recommendations (using as type the species suggesting the generic name as *Lutianus lutianus*, and using the one personally best known to the original author, as *Esox lucius*) should not have had precedence over 'the first reviser rule.' The present writer finds difficulty as above stated with the rule of the first reviser. In fishes, he finds the method of elimination practically worthless, at least, unless some rigid definition of it can be agreed upon. The arbitrary choice as type of the first species named under each new genus by its describer, is a rule which could have been enforced without confusion and which yet may be found necessary. It is, perhaps, too late now to go back to it, although several of the chief writers on fishes, Bleeker and practically Lacépède and Cuvier

have more or less consistently adopted it. It is at least fair to apply this rule to these particular authors and to others who begin their account of each genus with the 'type' or 'chef de file.'

A great deal can be said in favor of a principle in nomenclature, which may be stated as follows: The determination of the significance of each name, generic or specific, must be made on evidence furnished by the author framing the name or on evidence existing at the time. It is possible to give an exact type to every genus or species on this basis, or in default of this to follow the simple and just rule of page precedence. This gives fixedness at least, and we need demand nothing else. This method would release zoology from the unwelcome and profitless task of finding out what an author means, by studying the effect of his words on his successors. In other words, our studies in this line would be limited to the author himself and to those on whom he may have relied. The adoption of the rule that a specific name might be identical with the name of a genus has saved us, in the aggregate, years of investigation among useless and forgotten synonyms. This same kind of study is forced upon us by the rule of the first reviser or the still more complex custom of the application of the method of elimination.

Dr. Stiles evidently appreciates the incompleteness of article 30, for he supplements it by twelve rules of his own, saying that 'No existing code of nomenclature provides for all cases that arise, so that authors make supplemental rules for themselves.' But these supplemental rules are necessarily parts of a completed code. The final form of this code should, therefore, contain or replace these twelve excellent rules of Dr. Stiles. Till this is done, we may recommend that these supplementary rules be favorably regarded by naturalists, though in our judgment page-precedence—as a remedy for taste or whim—will ultimately be given a place higher up the line than that assigned by Dr. Stiles, and 'absolute tautonomy,' 'virtual tautonomy' and the Linnæan rule of using 'the best known European or officinal species' as type

will take precedence over the fixing of the type by the first reviser.

In the present bulletin, besides the original text of the International Code, Dr. Stiles gives pertinent discussions and illustrations, for the purpose of making plain the reasons for the rules adopted. He gives also a valuable discussion of the proper application of various names used in medicine as applied to animal or bacterial parasites. Among these names are *Tænia*, *Echinococcus*, *Bacterium*, *Spirillum*, *Spirodiscus*, *Bacillus*, *Dipylidium*, *Dibothrioccephalus* and *Monas*.

In conclusion we must congratulate Dr. Stiles for this most useful bulletin, which should be in the hands of every worker in systematic zoology, and most botanists would gain from its perusal.

DAVID STARR JORDAN.

*Handbuch der Geographischen Ortsbestimmung für Geographen und Forschungsreisende.* Von Dr. ADOLPH MARCUSE, Privatdozent an der Universität Berlin. Braunschweig, Friederich Vieweg und Sohn. 1905. 8vo. Pp. 341; 55 illustrations.

The author has produced a useful and interesting book which, according to the preface, is intended primarily for the guidance of geographers and explorers, but incidentally also for teachers and students. Having in mind the needs of the latter, he has included in his manual many subjects by way of explanation or suggestion which would not be considered necessary in a work intended solely as a guide for the determination of positions with a degree of accuracy commonly considered sufficient for geographical purposes. Thus five pages are devoted to an exposition of the state of our knowledge of the variation of latitude. By way of suggestion he refers to the application of photography to the determination of geographical positions, promising the publication of a manual of the photographic method on the completion of certain experimental work which he apparently has in hand, and which must have made very satisfactory progress, to judge from his remark on page 250 to the effect that longitude can readily be determined by means of a portable

photographic universal instrument to within one second of time. He also holds out the promise of success of some longitude work undertaken by Dr. Albrecht by means of wireless telegraphy. In this connection, it may be remarked parenthetically that the coast survey as early as 1901 obtained a satisfactory graphic record of wireless time signals sent to the Nantucket Station from the light ship for the purpose of testing the method of wireless longitude.

The requirements of the future are foreshadowed in an appendix on the determination of geographic positions by aeronauts. He describes a quadrant which was actually used during a balloon voyage and gives an example of the results obtained. In connection with the use of Sumner's method by aeronauts the author calls attention to the advantages of the use of 'Mercator's functions,' a name proposed by Börgen, who elaborated the new method of computation and published his formulæ and tables in the *Archiv der Deutschen Seewarte* (1898). On account of its simplicity and the avoidance of the usual logarithmic tables of the six circular functions, the new method is to be highly commended to navigators for whom it was devised. These references to Marcuse's book will be sufficient to indicate that it is by no means a mere rearrangement of old formulæ and methods.

The first chapter gives an explanation of celestial and terrestrial coordinates and of the variations to which they are subject. The second contains a very useful description of the Ephemerides published by various governments and evaluates their usefulness for different purposes. It gives descriptive and explanatory references to tables designed to facilitate computations, to star maps and celestial globes, etc.

The third chapter, which is devoted to instruments, gives a clear and very useful account of chronometers and their use. The author does not attempt to describe all known forms of instruments which might be used. Sextants and reflecting instruments he leaves to books on navigation. He recommends the use of the portable universal as the standard instrument which meets all requirements and

confines his descriptions to that form with the exception of a particular quadrant already referred to.

The fourth chapter treats of the methods which can be used most advantageously for determining time, latitude, longitude and azimuth.

The appendix, which, as already stated, gives attention to geographic determinations in the air, contains also a description with illustrative examples, of methods for determining time, latitude and azimuth without the use of graduated circles, methods for the application of which only a watch and a spool of thread are necessary auxiliaries.

The reader will be attracted by the beautiful typography and the excellence of the illustrations which enhance the value of the book.

O. H. T.

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#### SCIENTIFIC JOURNALS AND ARTICLES.

THE opening (October) number of volume 12 of the *Bulletin of the American Mathematical Society* contains the following articles: 'The Elementary Treatment of Conics by Means of the Regulus,' by Charlotte Angas Scott; 'Arzela's Condition for the Continuity of a Function Defined by a Series of Continuous Functions,' by E. J. Townsend; 'Galois Field Tables for  $p^n \leq 169$ ,' by W. H. Bussey; Notes; New Publications.

The November number of the *Bulletin* contains: 'Report of the Twelfth Summer Meeting of the American Mathematical Society,' by F. N. Cole; 'A Set of Generators for Ternary Linear Groups,' by Ida May Schottenfels; 'Note on the Structure of Hypercomplex Number Systems,' by Saul Epsteen; 'A Geometric Property of the Trajectories of Dynamics,' by Edward Kasner; 'On the Possible Numbers of Operators of Order 2 in a Group of Order  $2^m$ ,' by G. A. Miller; 'On the Arithmetic Nature of the Coefficients in Groups of Finite Monomial Linear Substitutions,' by W. A. Manning; 'A Modern Calculus of Variations' (Review of Bolza's Lectures on the Calculus of Variations), by E. R. Hedrick; 'Two Books on Analytic Geometry' (Review of Smith and Gale's Elements of Analytic Geometry and In-

troduction to Analytic Geometry), by O. D. Kellogg; Notes; New Publications.

*The American Naturalist* for September contains the following articles: 'Interrelationships of the Sporozoa,' by Howard Crawley, which opens with an excellent statement of the lines along which these animals have developed, and concludes that the term sporozoa should be used as a temporary and convenient cloak to cover certain protozoa. A 'Contribution to Our Knowledge of the Myxinooids,' by Julia Worthington, contains a large amount of interesting information, based on the Californian *Bdellostoma dombeyi*, concerning these little-known 'fishes.' F. C. Baker contributes 'Notes on the Genitalia of *Lymnea*'

*Bird Lore* for September–October has three excellent illustrated papers, telling how to attract and preserve the winter birds. 'Our Avian Creditors,' by Ernest H. Baynes; 'The Winter Feeding of Birds,' by Mabel Osgood Wright, and 'How to Attract the Winter Birds,' by Edward H. Forbush. W. W. Cooke presents the twelfth paper on 'The Migration of Warblers' and there are 'Notes on Winter Feeding' by a number of contributors. Under the Audubon Societies is an appeal for funds for the widow of Game Warden Bradley and for the prosecution of his murderer, which it is hoped may meet with a ready response.

*The Museums Journal* of Great Britain has a frontispiece and brief article on the Central Section of the Museum of the Brooklyn Institute and an account of 'A Papier-maché Model of the Monk-fish.' The appointment of A. B. Skinner as director of the Albert and Victoria Museum is announced, he taking the place vacated by Sir C. Purdon Clarke. Mr. George Murray has resigned his position of keeper of the department of botany in the British Museum, a place he has held for the last ten years.

THREE good papers appear as separates from the report of the Commissioner of Fisheries for 1903–1904: 'A Revision of the Cave Fishes of North America,' by Ulysses O. Cox; 'The Life History of the Blue Crab,' by W. P. Hay, and 'The Crab Industry of Maryland,' by Winthrop A. Roberts.